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tion of the gas producer in combination with the gas engine. The result in the first case will shortly be known as the White Star Line has taken this matter up and is building a large vessel equipped with such engines. The latter subject, however, although one of great interest in view of what has been done with the internal combustion engine, seems to warrant going deeper into the subject and has led up to its consideration on shipboard in connection with supplying gas for the use of the engine. In treating of the gas producer he not only speaks of the good features, but tells of the difficulties, which are of considerable importance, one being the cleaning of the fires and the other the replenishing of the water to produce steam admitted to the fuel when the vessel is in salt water. These are subjects which the enthusiasts on the gas producer have overlooked and will have to be taken care of in its development.

The questions from examination papers at the end of the volume, although some of them are unnecessary, for the proper care and management of the marine engine, such as "Define the term 'the Latent Heat of Steam,'" there are others which will be found valuable such as "Explain how a boiler is liable to suffer from undue haste in raising steam, and describe the precautions that are necessary when steam is being raised." The man who has the care of a steam engine should know all about the management of the boiler and no doubt will attend to his duties much better if his head is not filled with latent ideas.

HORACE SEE

NEW YORK,

October 21, 1908

Gray's New Manual of Botany. A Handbook of the Flowering Plants and Ferns of the Central and Northeastern United States and Adjacent Canada, rearranged and extensively revised by BENJAMIN LINCOLN ROBINSON, Asa Gray Professor of Systematic Botany in Harvard University, and MERRITT LYNDON FERNALD, Assistant Professor of Botany in Harvard University. New York, Cincinnati, Chicago, American Book Company. Seventh edition, illus-

trated. Copyright, 1908, by the president and fellows of Harvard College.

Sixty years ago Dr. Asa Gray issued the first edition of his "Manual of the Botany of the Northern United States," which covered the region "from New England to Wisconsin, and south to Ohio and Pennsylvania inclusive." In the second edition (1856) this rather limited region was extended southward so as to include Virginia and Kentucky, and westward to the Mississippi River, and here the boundaries remained for the third, fourth and fifth editions. The sixth edition was nominally "revised and extended westward to the 100th meridian," but in fact did not include all of the plants in the large addition to its area. The westward range of the present edition terminates at the 96th meridian, and it thus includes the trans-Mississippi states of Minnesota, Iowa and Missouri, and small fractions of eastern Nebraska and Kansas.

To one who was "brought up" on Gray's "Manual," this new edition has peculiar interest, and while many changes have been made in the old book the revisers have succeeded in preserving enough of the style of treatment, and the general appearance to make one soon feel at home in the new volume. The first thing that one who knew the old manual notices is the almost complete inversion in the sequence of the families, the book now following Engler and Prantl's "Pflanzenfamilien," instead of De Candolle's "Prodromus." This brings it into harmony with most modern systematic publications in this country and Europe, and makes it much more usable than it would have been had the old sequence been continued.

Another innovation is the introduction of many illustrations (numbering more than a thousand) which help to make the specific descriptions more distinctive. These are usually selected with much care, being used only when they can certainly help the text. Thus in the grasses (*Gramineae*) and sedges (*Cyperaceae*) they are very freely used, as they are also in *Umbelliferae*.

In regard to nomenclature we are told that the editors have scrupulously endeavored to

bring it "into accord with the Vienna agreement." Accordingly the law of priority is observed, and also that requiring the double citation of authorities in certain cases. These, with the acceptance of the year 1753 as the date of the beginning of the binomial nomenclature, and the partial decapitalization of specific names, bring about many changes in the form and appearance of the names of familiar plants, so that sometimes one is not quite sure of the identity of particular species. To help such a situation the authors have judiciously introduced synonyms for certain genera and species.

Although the work is supposed to be rather conservative one notices a surprising number of significant changes in the names of plants. Thus we find *Amaranthus*, instead of *Amarantus*; *Nymphaea*, instead of *Nuphar*; *Castalia*, instead of *Nymphaea*; *Radicula*, instead of *Nasturtium*; *Gleditsia*, instead of *Gleditschia*; *Acer saccharum*, instead of *A. saccharinum*; *Acer saccharinum*, instead of *A. dasycarpum*; *Acer negundo*, instead of *Negundo aceroides*; *Psedera*, instead of *Ampelopsis* or *Parthenocissus*; *Lomatium*, instead of *Peucedanum*; *Brauneria*, instead of *Echinacea*; *Agoseris*, instead of *Troximon*, etc. Many minor changes in specific names due to observance of the law of priority may be noticed in glancing through the book; thus we find *Populus deltoides*, instead of *P. monilifera*; *Carya ovata*, instead of *C. alba*; *C. illinoensis*, instead of *C. olivaeformis*; *Fagus grandifolia*, instead of *F. ferruginea*; *Maclura pomifera*, instead of *M. aurantiaca*; *Gymnocladus dioica*, instead of *G. canadensis*, etc. That the authors have not been carried away by the flood of new "species" is shown by the fact that they enumerate only sixty-five species of *Crataegus*. They have not been as successful in the genus *Viola* where they admit forty-five species. *Sisyrinchium* is allowed thirteen species, in place of the single species in the first to the fifth edition. Yet we are thankful that the authors have held down the species makers to the extent they have, and we take it as an omen of better things in this regard.

In closing this very general notice of this important addition to the literature of systematic botany we wish to record our opinion that this is the right kind of a revision of such a standard work. It honors the great botanist much more to bring out such a modernized edition than to insist upon retaining the original treatment in all particulars as was done in the ill-starred sixth edition of this manual. The spirit of Dr. Gray was always progressive, and it is right that the successive editions of his books after his death should retain this characteristic, as has been done so well in the volume before us.

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SCIENTIFIC JOURNALS AND ARTICLES

THE concluding (October) number of volume 9 of the *Transactions of the American Mathematical Society* contains the following papers:

G. D. Birkhoff: "Boundary values and expansion problems of ordinary linear differential equations."

A. B. Coble: "An application of the form problems associated with certain Cremona groups to the solution of equations of higher degree."

E. B. Wilson: "On the differential equations of the equilibrium of an inextensible string."

Max Mason and G. A. Bliss: "The properties of curves in space which minimize a definite integral."

Arnold Dresden: "The second derivatives of the extremal integral."

R. L. Moore: "Sets of metrical hypotheses for geometry."

"Notes and errata, volume 9."

THE opening (October) number of volume 15 of the *Bulletin of the American Mathematical Society* contains: "Construction of Plane Curves of given Order and Genus, having Distinct Double Points," by Virgil Snyder; "On Periodic Linear Substitutions whose Coefficients are Integers," by Arthur Ranum; "Even Multiply Perfect Numbers of Five Different Prime Factors," by R. D. Carmichael; "The Fourth International Congress of Mathematicians: Sectional Meetings," by